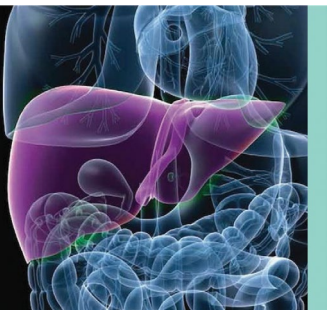

Hepatitis C Virus Prevalence, Screening, and Treatment Among People Who Are Incarcerated in Canada: Leaving No One Behind in the Direct-Acting Antiviral Era

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More than 50% of people who are incarcerated (PWAI) in Canada report a history of drug use,[1] and about 76% of people who inject drugs (PWID) in Canada have a history of incarceration,[2] resulting in higher prevalence of hepatitis C virus (HCV) among PWAI compared with the general population.[3] The *Blueprint to Inform Hepatitis C Elimination Efforts in Canada*,[4] published by the Canadian Network on Hepatitis C in 2019, identifies PWAI as a priority group for increased access to HCV care. Consequently, HCV screening and treatment in correctional settings are priorities to improve the health of PWID and PWAI and to achieve the World Health Organization's 2030 HCV elimination targets. Although promising HCV screening strategies and models of care in correctional settings exist across Canada, efforts to implement HCV prevention, screening, and treatment programs in correctional settings have been slow. However,

Abbreviations: CSC, Correctional Service Canada; HCV, hepatitis C virus; PWAI, people who are incarcerated; PWID, people who inject drugs; STBBI, sexually transmitted and blood-borne infection.

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recent policy changes have made HCV elimination within Canadian custodial settings by 2030 a possibility.

HCV IN THE CANADIAN FEDERAL CORRECTIONAL SYSTEM

Correctional Service Canada (CSC) manages and maintains 43 institutions where people sentenced for 2 years or more are detained. Statistics Canada reported an average daily count of 14,129 people in federal custody in 2017/2018, with 6903 admissions over the same period.[5] In 2014, HCV antibody prevalence rate was estimated by CSC at 18.6% among federally incarcerated men and 22.7% among women (Fig. 1).[6] As a result of ongoing colonization in Canada, indigenous people are vastly overrepresented among PWAI and disproportionately impacted by HCV[7]; among indigenous men and women who are incarcerated, 27.7% and 44.8%, respectively, are estimated to have HCV antibodies.[8] Among people who entered federal custody without prior HCV exposure, incidence of HCV acquisition is estimated at 25 cases per 1000 PWAI at risk per year.[9]

HCV screening at intake to federal corrections is universally offered to all entrants, with 80% to 90% accepting testing.[6] Universal, or opt-out, testing in correctional settings results in higher uptake compared with opt-in or on-demand testing,[10-12] and therefore should be a high-priority intervention for all correctional settings. All PWAI in federal institutions are eligible for HCV treatment irrespective of fibrosis staging and are offered treatment by CSC-contracted physicians. Beginning in 2018, CSC began rolling out prison needle exchange programs in federal institutions, with 11 implemented so far.[13] In 2019, CSC also began an Overdose Prevention Service at Drumheller Institution in Alberta, where drugs can be consumed by PWAI under supervision, with sterile drug use equipment provided.[14] CSC has not yet published data regarding the proportion of PWAI who initiate and complete treatment; however, CSC is well positioned to achieve HCV elimination within federal Canadian correctional institutions within the next decade as best practices such as universal HCV screening, access to treatment, and harm reduction services are available.

HCV INFECTION AMONG PEOPLE WHO ARE PROVINCIALLY INCARCERATED IN CANADA

Provincial and territorial governments are responsible for their correctional systems, respectively, across Canada. Both systems detain people who are on remand (awaiting trial or sentencing) and people who are sentenced to a custodial period of less than 2 years. People sentenced in federal corrections may have served an initial period of their sentence in provincial corrections while awaiting trial or sentencing. Provincial/territorial corrections are characterized by a large number of intakes and releases because of the short average duration of incarceration, with 234,675 custodial admissions to provincial and territorial correctional centers in 2017/2018.[5] There are large gaps in published estimates for HCV antibody prevalence among PWAI in provincial/territorial corrections across Canada, and significant heterogeneity exists among published

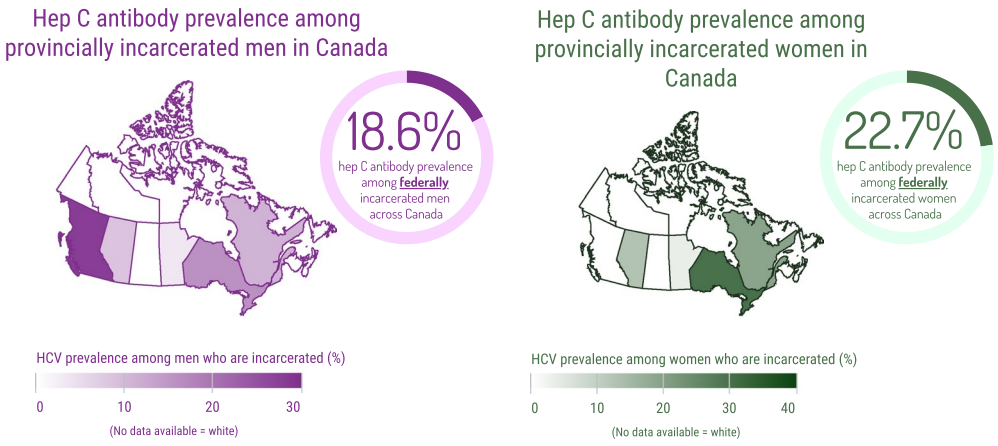

FIG 1 Most recent published HCV (Hep C) antibody prevalence estimates among men and women who are incarcerated federally and provincially in Canada (see Table 1 for a detailed breakdown and references). See http://www.hepcorrections.org/map for a similar map of HCV antibody prevalence among people who are incarcerated in the United States (map by Emory Center for the Health of Incarcerated Persons and MGH Institute for Technology Assessment).

TABLE 1. PUBLISHED HCV ANTIBODY PREVALENCE ESTIMATES AMONG MEN AND WOMEN WHO ARE INCARCERATED FEDERALLY AND PROVINCIALLY IN CANADA

HCV Antibody Prevalence Rate	Province or Territory	Federal or Provincial	Sex	Study Type	Study Period	Year Published	First Author
28.00%	British Columbia	Federal	Male	Cross-sectional	1989	1994	Préfontaine[40]
27.90%	Ontario	Federal	Male	Cross-sectional	1994	1995	Pearson[41]
39.80%	Ontario	Federal	Female	Cross-sectional	1994	1995	Ford[42]
33.00%	Ontario	Federal	Male	Cross-sectional	1998	2000	Ford[43]
25.90%	National	Federal	Male	Cross-sectional	2002	2004	De[44]
34.00%	National	Federal	Female	Cross-sectional	2002	2004	De[44]
16.60%	Quebec	Provincial	Male	Cross-sectional	2003	2007	Poulin[45]
29.20%	Quebec	Provincial	Female	Cross-sectional	2003	2007	Poulin[45]
15.90%	Ontario	Provincial*	Male	Cross-sectional	2003/2004	2007	Calzavara[46]
30.20%	Ontario	Provincial*	Female	Cross-sectional	2003/2004	2007	Calzavara[46]
21.70%	National	Federal	All	Modeled	2005	2007	Remis[47]
16.9%	National	Provincial	All	Modeled	2005	2007	Remis[47]
24.90%	National	Federal	Male	Retrospective	2005-2012	2016	CSC[8]
33.10%	National	Federal	Female	Retrospective	2005-2012	2016	CSC[8]
24.00%	National	Federal	All	Modeled	2011	2014	Trubnikov[48]
23.25%	National	Provincial	All	Modeled	2011	2014	Trubnikov[48]
3.50%	Manitoba	Provincial*	All	Retrospective	2012	2014	Hodge[49]
18.60%	National	Federal	Male	Retrospective	2014	2016	CSC[6]
22.70%	National	Federal	Female	Retrospective	2014	2016	CSC[6]
19.2%	Quebec	Provincial	Female	Cross-sectional	2014/2015	2018	Courtemanche[50]
11.90%	Quebec	Provincial	Male	Cross-sectional	2014/2015	2018	Courtemanche[50]
11.00%	Quebec	Provincial	Male	Retrospective	2017/2018	2019	Kronfli[51]
12.60%	Alberta	Provincial	Female	Retrospective	2012-2015	2019	Gratix[52]
8.50%	Alberta	Provincial	Male	Retrospective	2012-2015	2019	Gratix[52]

*Only remand centers were included in this study (people awaiting trial or awaiting sentencing).

estimates (Table 1 and Fig. 1). One consistent aspect is that incarcerated women have a higher HCV antibody prevalence compared with incarcerated men. This is likely because incarcerated women are more often detained for drug-related offenses compared with men, resulting in a higher proportion of incarcerated women also being PWID. HCV antibody prevalence in published estimates appears to decrease over time among both men and women, explained by secular trends such as a lower proportion of people being incarcerated for drug-related offenses, or a cohort effect, with HCV antibody prevalence being lower among younger cohorts entering prison in more recent decades. However, this may also be a sampling or measurement bias.

Due to short sentences and high numbers of intakes and releases, continuity of care on release to the community should be prioritized. For example, the average length of stay is 59 days among sentenced PWAI in British Columbia Provincial Corrections, with 37,000 intakes and releases per year.[15] However, due to competing priorities at release, and the absence of systematic discharge planning and services such as patient navigation, linkage to care remains a major challenge. Continuity of care on release is a major challenge globally, with calls to streamline provision of health care in corrections with health care in the community.[16] As a result, several Canadian provinces have transferred the responsibility for the provision of health care from corrections authorities to local health authorities. In provinces where this has occurred, improvements in health care have been reported.[15,17,18] Transfer of responsibility for health care to health authorities in other jurisdictions could assist in streamlining the provision of HCV screening, treatment, and retention in care after release.

Most provincial/territorial correctional centers across Canada offer risk-based or opt-in HCV screening, although Alberta recently implemented universal sexually transmitted and blood-borne infection (STBBI) screening on entrance to remand centers.[19] Furthermore, HCV treatment is offered in provincial/territorial corrections; however, depending on the province/territory, restrictions such as advanced fibrosis/cirrhosis and sentence length exist.[20,21] Fibrosis stage eligibility restrictions were deemed an infringement on human rights in federal corrections; however, because of jurisdictional and funding issues, the lifting of this restriction has not yet occurred in all provinces and territories. These restrictions must all be removed before HCV elimination in Canada is possible. Further, unlike in federal correctional institutions,

sterile injection equipment is not available; therefore, PWAI who inject drugs in these centers must share drug use equipment and consume drugs in ways that increase the risk for harm. This increases their risk for acquiring and transmitting HCV (both primary and reinfection), further concentrating the epidemic among PWAI and undermining HCV elimination efforts.[2,22] Until best practices for HCV prevention, screening, and treatment can be modeled after federal corrections, HCV care to PWAI in provincial/territorial corrections will lag behind.

EVIDENCE SUPPORTING HCV TREATMENT SCALE-UP IN CORRECTIONAL SETTINGS

Several studies have demonstrated that scaling up HCV testing and treatment in correctional settings, or "micro-elimination" approaches, can reduce HCV transmission among PWID, both in prisons and the community,[23-25] and are demonstrated to be cost-effective.[26-28] "Treat all" approaches aiming to achieve microelimination of HCV infection in correctional settings are feasible, as demonstrated in Australian prisons,[29,30] the United States,[31] and Spain.[32] Because screening is the first step in HCV care, increasing uptake is crucial to improving care pathways for PWAI and may positively impact transition into the community[33]; therefore, universal STBBI screening at intake should be implemented, as has been done by CSC and in Alberta. Point-of-care[34,35] or dried blood spot[11] testing could facilitate universal HCV testing strategies among PWAI. To increase overall HCV care of PWAI, responsibility for the provision of health care in correctional centers should be transferred to local health authorities, as has now been done in several Canadian provinces. To further optimize treatment uptake and linkage to care, scale-up of evidence-based interventions is needed in provincial and territorial corrections. These include telemedicine,[10,36] team-based care,[36] and peer support and education programs.[37] Finally, mobile phone-based applications and text messaging, also known as mHealth,[38] have been shown to increase HIV treatment adherence among PWAI released to the community and could improve linkage to HCV care after release.[34] "Prison health is public health"[3,22,39] and efforts to reduce the burden of HCV among PWAI will undoubtedly also reduce its prevalence in the community. It is unlikely that global initiatives such as the elimination of viral hepatitis by 2030 will be achieved while the standard of HCV care available in prisons remains low.

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